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IN TWO SECTIONS

Section 1

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EDITORIAL DEPARTMENT NOTE

Accounting, which was originally historical in function, has within recent years made rapid strides in another field, the field of control. When industrial accountants speak of control they usually mean control of costs, but the field of control in industry is much larger than this and accountants have contributed much to the larger field. Production control, inventory control, fixed asset control, the control of personnel and financial control are all fields in which the industrial accountant has been active. The type of control with which the first article in this issue of the Bulletin is concerned is the type found in inventory and fixed asset control. Returnable containers may, depending upon circumstances, be considered as either inventory or fixed assets. The problem of accounting for and controlling the use of these containers is a most important problem in those industries where the products are sold in returnable containers and the investment in these containers is very great. Rapidity of turnover is important and control through the accounts is most important.

The author of this article is Wyman P. Fiske, Associate Professor of Accounting at Massachusetts Institute of Technology. Professor Fiske is a graduate of Harvard College and Harvard Graduate School of Business Administration and is a member of the Massachusetts Bar. Following his graduation he spent five years as instructor of accounting at the Harvard Graduate School. He has also served as Office Manager of the Boston Office of the Amoskeag Manufacturing Co. Professor Fiske has been active in the work of the Boston Chapter, having served as its President in 1932-33. He is co-author of *Accounting*, an introductory text published recently by Henry Holt & Co.

Our second article is concerned with a description of a type of mechanical office equipment about which little has been written. Mechanical check writing provides not only for the release of important officials from the drudgery of check signing but also makes possible a better control of cash disbursements. A. A. Keiser, the author of this article, was educated at Ohio Northern University and in addition to work in corporation accounting and office management has taught advanced accounting in the Dayton high schools. For the past ten years, Mr. Keiser has done extensive research work in the development and sales of bookkeeping machines and office equipment and has devoted much time to devising and installing office systems. At the present time he is connected with the Accounting Machine Sales Department of the National Cash Register Co. Mr. Keiser is a member of our Dayton Chapter.

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OCTOBER 1, 1935

PRACTICE IN ACCOUNTING FOR RETURNABLE CONTAINERS

By Wyman P. Fiske, Associate Professor of Accounting, Massachusetts Institute of Technology, Boston, Mass.

TO THE casual guzzler of a glass of beer, the fact that the container from which the beverage was drawn has a greater value than its contents is of little interest. To the brewer, that fact involves a problem of control of expenses and investment. Early return and repeated use of the modest beer keg is essential to low selling prices to the consumer and to profitable operations for the manufacturer. The earliest methods of controlling returnable containers were clumsy and inefficient, but because they were used only on small numbers of containers, gave accurate results. An illustration of such a method is found in early British breweries. Each customer of the brewery was given a box containing metal disks on which was stamped the same identifying number. When a barrel was delivered to the customer one of these disks was collected and taken to the brewery, where it was placed along with the disks of other customers in a receptacle. This collection of disks at the brewery represented the total outstanding containers and showed their locations. The shortcomings of such a system for a large brewery or for one having any number of new customers are apparent.

Returnable containers are now in widespread use throughout industry. Numerous examples may be found in addition to the again popular beer barrel. Carbonated beverages are sold in bottles which are returned. Milk is sold in bottles and cans which are used many times over. Compressed gases are sold in steel cylinders which are so expensive that they must be used again and again. Oil and chemicals are sold in steel drums, glass carboys, air tight tins, or even tank cars which because of their cost must be used repeatedly. Certain fruits are sold in returnable crates and cement in bags. This list, while not exhaustive, will give some idea of the number of industries which use returnable containers.

The importance of the container problem to those companies faced with it forces such companies to give serious consideration to selecting the most satisfactory methods of control. One large

beverage company has over a quarter of a million dollars invested in cases and bottles which cost more per unit of sale than does the beverage sold. Chemical companies in some instances use tank cars that represent an investment in the thousands of dollars each. In every case, the container is delivered into the hands of a customer who must be induced to return it as quickly as possible in order to increase the effective use of the package. Records must be set up to keep track of the containers and to provide a basis for control of the expense involved. In order to determine the methods by which control is maintained, an investigation* was carried on with a group of representative companies which included three beverage, two oil, four dairy and ice cream, two chemical, three compressed gas companies, and one fruit company. This paper represents the results of this investigation and is designed to describe practice rather than theory.

Two Plans Used

The plans used for control of returnable containers fall into two general classes: no-charge plans and deposit plans. A general description of these two groups will provide a necessary background for the industry case studies which follow.

No-Charge Plans

Under all no-charge plans, when a container is sent out, no charge is made to the customer. Either an additional amount is charged for the container's contents, or a complete record is kept of how many containers were shipped to, received from, and are in the possession of each customer. A means of determining the length of time the containers were in the customer's possession is also generally provided. Although the container losses under this method are apt to be greater than when the deposit plan is used, there are certain definite advantages to be attained by this system. Most customers are naturally reluctant to tie up working capital in container deposits—especially when the unit cost of the container is high. The company therefore, gains good will, or at least prevents the formation of ill will on the part of its customers.

*This investigation was made in connection with a graduation thesis, under the supervision of the author, by two seniors at the Massachusetts Institute of Technology, Messrs. J. L. H. Kemper and A. E. Beckwith.

In addition, office work is considerably reduced since it is unnecessary to account for deposit money received from the customers and to go through the additional charging and crediting steps.

The three milk companies studied make no charge for the bottles in the case of milk for home delivery, but do charge additional for the contents. This is necessitated by their selling methods. They consider the use of containers to be a distribution expense.

The compressed gas companies, like the milk companies, make no charge for their containers. Since the steel cylinders used are very expensive, all of the companies have developed methods of accelerating their return. Quantities in the hands of customers and the length of time they have been held are accounted for by means of a delivered, returned, balance system. This is the simplest method and, where satisfactory, is the best. Two of the companies feel that this alone is not adequate. One makes use of a rental charge applied to the container if it is not returned within a stipulated period. While this method requires slightly more bookkeeping, it has proved very satisfactory. Most customers return the cylinders promptly and are therefore not affected by it; the others, whom it is designed to penalize, are the least attractive customers anyway, since they increase the cost of operation.

The other compressed gas company makes use of individual numbers stamped on the cylinders. A card file is kept of the cylinder numbers and records made of each shipment and return. While this system gives accurate information of the date of shipment and return of each cylinder, it is expensive because of the great amount of detail work it requires. Because of human clerical mistakes, in many cases it has been found to be inaccurate. The company feels that the liability is so definitely fixed that it is assured the return of the cylinders. All of the gas companies call or communicate by mail with the companies which they believe are withholding cylinders.

Neither of the oil companies makes an initial charge but rather charges for the barrels if not returned within a stipulated time. They do not hesitate to credit their customers with the amount charged if the barrels are returned after the end of the period. One company uses the number system, claiming the advantages

described above; the other has discarded it, considering it not worth the expense.

The ice cream companies make no charge for the use of containers and do not keep records of the number of cans in the hands of customers. The system does not give good control over the containers, but in most cases plans are under way to eliminate the use of returnable containers.

In the case of tank cars, the chemical company is unable to charge a deposit because of the high unit cost. Close records are therefore a necessity. The individual number system is used and it has been found that adequate information is made available by it. The large amount of clerical work is justified by the high value of the container.

Deposit Plans

Under the deposit plans, the customer is charged with a deposit when a container is sent out. The deposit is sometimes collected and sometimes allowed to remain as a debit to the customer's account. If the deposit covers the complete cost, no records are essential; if less than the cost, the company to protect itself must keep accurate records. In general these methods keep down the number of containers needed for business and are generally used where the deposit required is not too high, where the credit risk is great, or where competitive practice, in order to reduce the price, demands them. The deposit plan requires more clerical work than the no-charge plan, but assures a better return of containers. The companies at times incur ill will but if the entire trade follows the practice it is not harmful.

The milk companies charge a cash deposit for the bottles sold in stores. As this is a cash transaction between the driver and the storekeeper, the company keeps no records. This plan allows a lower price to be charged for the milk.

The beverage companies also charge a deposit on their bottles. This is charged along with the contents to the customer's account. When a customer returns bottles, his account is credited with their deposit price. This system enables the company to reduce the price of its product. It has the further advantage of making the customer pay for his breakage and reducing the losses due to carelessness on the part of the customer.

The deposit imposed by the fruit company investigated does not cover the cost of the containers. It must therefore keep accurate quantity records to protect itself from loss. This is done in addition to the regular container charges made to the customers. This system enables it to maintain a smaller inventory of containers and, because the charge is small, does not reduce good will to any appreciable extent. This method requires more clerical work.

The N. R. A. Code required a deposit be charged on containers by the brewing companies. In this industry two types of containers are used—bottles and barrels. In some cases where the risks are great, the deposit for the container is collected; where the customers are good credit risks, the deposits are simply charged to the customer and no strenuous effort is made to collect them. In all cases, however, exact records of the containers outstanding are kept on special columns of the customer's account. The summary of the customers' ledger will show the total number of containers outstanding. An examination of these accounts will locate large tie-ups of containers. Arbitrary estimates of those lost can also be made. This system is quite expensive, although it is considered that the savings more than compensate for the expense incurred.

Because the containers are so adaptable to the uses of their customers, the chemical companies are forced to charge a deposit. Except for customers in good standing, who promptly return the containers, this is always collected. Because of their refusal to pay for non-returned containers, customers have been dropped. One of the chemical companies is a jobber and merely passes on the deposits with which it is charged. Special container receivable accounts are maintained for the members of an industry who refused to pay deposits. The fact that the deposit is higher than the actual cost insures their return, making the keeping of special records unnecessary. The system is cheap but is likely to cause ill will among the customers.

The various companies have added to both systems the measures described to speed up the return of the loaned containers. If under these conditions the supply of containers is insufficient to meet the normal demand, the company will know that its supply is below the optimum; on the other hand, if its supply is excessive during peaks, it will know that its supply is too great.

The Treatment of Containers on the Balance Sheet

Containers which have a long life and are permanent in nature are usually considered to be part of the working equipment of a company and are carried on the books as fixed assets. They are therefore depreciated over their estimated life.

Many containers are easily breakable. With regard to these there is no fixed practice. In some cases the companies prefer to consider them as fixed assets and to maintain a high enough depreciation charge to cover replacements. Others prefer to consider the containers as a supply inventory and to charge their replacement to expense. The replacement method is more accurate as it expresses the actual loss in value of the company's containers. If an accurate method of determining container losses is used, such as that of the E Milk Company, no adjustment will be necessary to bring the book value of the containers into agreement with the actual number as determined by a physical count. An estimated depreciation charge will probably require periodic adjustments in order that the container account be truly representative.

Accounts Necessary to Control Containers

When a container is first bought, the usual procedure of debiting the asset account and crediting accounts payable or cash is used. Under the deposit system, when a container is loaned, accounts receivable or a deposits received account is debited and some such account as "Containers Outstanding" is credited. When they are returned, an opposing entry is made. When containers are deemed lost, the containers outstanding and the reserve for depreciation accounts are debited—the containers outstanding account at the deposit price and the reserve for depreciation account at the amount the container has been deemed to be depreciated. At the same time, the container asset account is credited with the original cost of the container. The difference is either a debit or credit to profit and loss, a debit showing a loss and a credit a profit. When there is no deposit and the company cannot collect, the container asset account is credited, the reserve for depreciation account is debited the amount the containers lost are estimated to have been depreciated, and the balance, which is a debit to profit and loss, denotes a loss.

Repairs and Maintenance

Most of the companies, in handling repairs and maintenance, charge them to production expense. However, the milk companies charge them to distribution expense. One company, however, considers them a subtraction from depreciation on the theory that it lengthens the life of the containers. Another company, since it feels that it maintains its containers in first class condition, charges repairs and maintenance as a depreciation expense.

Deposit Reserves

Most companies making use of the deposit plan feel obligated to maintain some sort of reserve for the purpose of redeeming outstanding containers. They are able to determine the total amount received by the "Deposits Received" or some such account. Several of the companies maintain the full amount that they have received. Others maintain just a fraction, for they know from experience and the laws of chance that the full amount will never be called for. One company feels that because its accounts receivable more than offset its container liabilities there is no need to keep any reserve. Although the first method is the safest, the last is the most profitable, for the company can make use of part of its fixed assets for working capital.

Industry Case Studies

A summary of individual conditions reported will undoubtedly be of greater interest than the generalizations preceding. In order to condense into reasonable length the fifteen situations examined, an industrial treatment of the container problems of six industries will be considered.

Beverages

The three companies visited included two breweries and one carbonated beverage manufacturer. In the beverage industry the containers are of necessity a large part of the capital investment of the business. Two distinct types of containers are used—barrels (by the breweries) and cases and bottles (by both the breweries and the carbonated beverage manufacturers). The methods of accounting for these two types are quite different because of the

difference in value and breakability. All companies are forced to deal with customers of widely varying credit standings. For this reason, methods of dealing with customers are not completely uniform. The N. R. A. Code for breweries required that in all cases a stipulated amount be charged for containers loaned. It is to the companies' advantage to keep the turn-over on containers at a maximum in order to keep the capital investment at a minimum.

In order to record the charge made for a container, two of the companies keep a separate set of columns in the customers' ledger. This enables them to have exact figures of the quantities in the hands of each customer and the total number outstanding. Quantities of containers to be charged to each customer are obtained from the office sales records. Quantities to be credited each customer come from the driver's delivery slips. A control account is kept for containers and is made from the daily shipping and receiving summaries. From this record and from the container account, the company is able to determine how many containers it has on hand for use. If it finds itself short of barrels it can determine from these records where large stocks of containers are being held and can take steps to remedy the situation. These records also indicate outstanding liability for containers loaned. The companies feel that keeping an individual record for each container would be an unnecessary expense.

One company carries all its containers as fixed assets and considers them part of its working equipment. Barrels and cases are depreciated over their normal life (fifteen years); bottles are not depreciated but replaced when broken. The other two companies carry their containers as an inventory and do not depreciate them. In one of these two cases, replacements are charged to expense in lieu of depreciation. The other determines losses by physical inventory.

The practice as to showing any liability for containers outstanding also varies. Only one company keeps this reserve at the full amount of the deposits charged on containers. A second determines the amount "from past experience." The third has arrived at a standard percentage for outstanding containers which will not be returned and uses this percentage to adjust the inventory of containers. Because customers usually exchange an

empty container for a full one, this same company feels that it is necessary only to set up a small provision for containers outstanding (less than 10%).

All three companies charge cost of repairing cases and barrels to production expenses.

Oil companies

The two oil companies visited had a container problem in the form of steel drums used to ship lubricating oil. These drums cost between eight and ten dollars each. No deposit is required by either company except in the case of drums not returned within ninety days. In the latter case, the customer is billed for the drum in exactly the same way as for a sale of merchandise. Both companies credit the asset account for drums billed to the customer. The excess of the billing over cost is credited to other income by one company; the other bills at cost and hence has no problem of accounting for a profit. Since no deposit is required at the time the drum goes out, neither company shows any liability for containers outstanding.

Both companies treat drums as fixed assets and both charge depreciation based on the expected life. Repairs and maintenance are treated as operating expense. Breakage is so rare that it need hardly be considered. In case a drum is returned in a condition beyond repair, it is not accepted and the customer is billed for its value.

In one company, in order to keep track of how many containers each customer has in his possession and how long he has had them, each barrel is numbered and a customer container ledger is kept. Each of the company's customers has a sheet in this ledger upon which is shown the exact containers in the possession of the customer identified by means of the number each bears; and the date upon which each individual container was delivered to the customer. When a barrel is returned or charged to the customer's account, a cross is made opposite the barrel's number in a column marked "returned." A sample of this sheet is shown as Exhibit 1.

A card index—a card for each barrel—is also kept. (See Exhibit 2.) On this card is recorded the date when a barrel was loaned out, to whom it was loaned, and when it was returned. This acts somewhat as a check on the customers' container ledger.

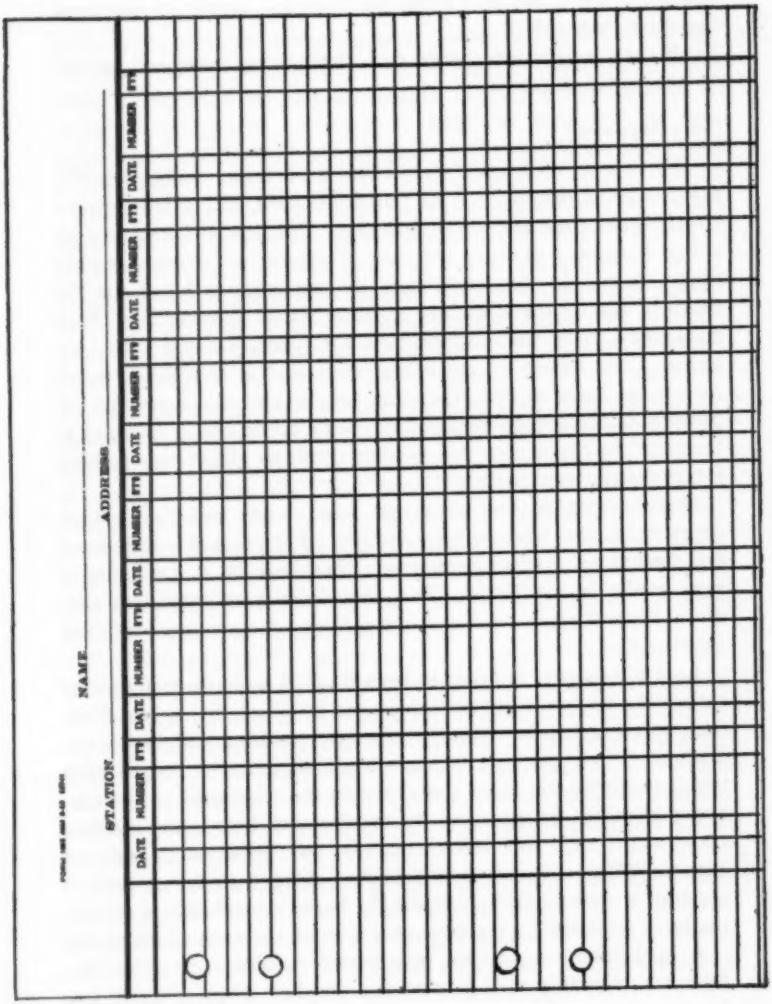

EXHIBIT 1

Out	No.	In

EXHIBIT 2

By this double system the company can easily find any mistakes made in the recording of the barrel numbers. By an examination of the card index it can ascertain fairly accurately how many barrels can be considered to be lost. In case of container disputes with its customers, it has very complete information available.

The other company keeps a similar customer record but with identifying numbers. Up to recently it was also the practice of this company to have individual barrel records kept by numbers. The company felt that the additional information and control was not worth the high cost of getting it. Mistakes in the records were frequent.

Dairy Companies

In the dairy business, trade practices dictate the policies followed. No charge is made to retail customers for the bottle in which milk is delivered. A charge for store bottles is universal. When milk is sold to restaurants, either in cases or bottles, no deposit is required for the packages. Ice cream containers are also handled under the no deposit plan.

Although a deposit is required in the case of store bottles, all the companies follow the practice of collecting cash from the drivers for all store bottles going out; the drivers are then paid

or credited for all bottles returned by them. In this way, accounts receivable for container deposits are entirely avoided. The really difficult problem here is one of checking. One company found that it paid its drivers in one year for more bottles returned than it shipped out.

It is general practice to carry glass as supply inventory and milk and ice cream cans as fixed assets. Bottles are handled on a replacement basis while cans are depreciated. One company charges bottles as bought to "Bottles in Stock." As they are needed for delivery purposes, bottles are transferred from this account to "Bottles in Service." In computing the inventory on hand and the write-off for bottles broken or not returned by customers, an assumption is made that bottles are out five days on the average. Hence five days' sales are added to bottles on hand to determine the inventory and the difference between this and the charges to bottles in service is charged to expense.

Bottles broken in the plant are accounted for differently. One company charges the cost to production cost, one to distribution expense, and one to the department in which the breakage occurred. In one plant, at least, breakage is determined by records of weight of broken glass. The company now charging bottle breakage to distribution made studies in order to break down bottle breakage by departments but decided that the cost of such a breakdown would be in excess of any gain resulting from the additional information.

Similarly, there is a variation in practice as to treatment of repair expense on cans and cases. One company charges this to delivery expense, one to production and one to the reserve for depreciation on cans. The latter practice is justified on the grounds that such renewal extends the life of the cans.

Fruit Company

The fruit company deals with a great variety of customers—large chain stores which use truck loads of fruit, and small stores which use one or two cartons a day. The company has a stock of about 50,000 fruit containers,—the cost of which varies between $1.50 and $1.75. To insure the return of these containers a deposit of $1.00 is required on each. In spite of this, the customers often withhold them or manage to obtain containers which have

Date	Boxes			Covers			Baskets			Blankets		
	In	Out	Bal.	In	Out	Bal.	In	Out	Bal.	In	Out	Bal.

EXHIBIT 3

never been charged to them. For this reason the company has spent a lot of time and money in an endeavor to solve the container problem and has been quite successful.

The deposit charge on containers is directly included on the bill and on the customer's account. The company segregates the charges, however, and codes them—fr. for fruit and bx. for boxes. Since the company does not receive the replacement cost of the containers as a deposit, it is extremely anxious to get them back in order to keep losses at a minimum. It therefore keeps a ledger, a sheet for each customer, on the form illustrated in Exhibit 3, which shows in quantities how many and on what dates containers were delivered to the customer, how many and on what dates they were returned, and the balance in the hands of each customer. This information is taken off the daily sales records and delivery slips. If it is discovered that an individual customer is holding back

containers, he is called on the phone or written to with regard to the matter. In addition to the regular records kept by the accounting department, each driver has a small notebook in which each customer on his route, in the order delivered to, is listed—a page for each. Drivers list in this all the containers delivered to and received from each customer. This acts as a check on the other records and on the driver as well.

This company considers its containers to be part of its working equipment and therefore, considers them as fixed assets. The containers are depreciated over their estimated life—four years. Repairs and maintenance are always considered by this company to be an operating expense. In the case of minor breakage of a container while in the customer's hand, it is accepted for return; on complete breakage, however, the company refuses to refund the deposit price.

In order to ascertain how many containers have been lost during a year, an inventory is taken. This is taken over a period of four winter months when the circulation of containers is at its lowest. Each container in stock is taken into inventory and stamped with some identifying mark, a different one being used each year. As other containers come in, they are included in the inventory and stamped. In this way the entire inventory is taken. The difference between this and the last year's inventory, plus the purchases during the period, if there were any, is considered to be the container losses. This amount is then closed out—the containers lost being considered the oldest and greatest amount depreciated—to profit and loss. All the money paid in as container deposits is kept to redeem outstanding containers. A part of this, the amount deposited on those not returned, is used to replace the lost containers and thus an unnecessary surplus does not keep building up.

Chemical Companies

Of the two chemical companies visited, one was a manufacturer and one a distributor. The manufacturer has found from experience that its customers are very apt to find use for the loaned containers within their own plants. For this reason the company makes it a practice to charge a deposit for them (tank cars and trucks of course being excluded because of their high

value) which is higher than the actual cost of the containers. Because of its stringent credit policy, it collects in most cases for the containers charged. If a customer refuses to pay the deposit price but is fairly prompt in returning the containers, no action is taken, the amount charged being carried on the customer's book account. If a customer persists in not paying for and not returning the containers, his account, as it is highly unprofitable, is dropped. The deposit price is, therefore, charged to the customer along with the contents. A billing machine separates on the invoice the container charge and the material charge, and, at the same time, records the charges in the same manner to the customer's account. The company has a "Reserve for Redemption" which is credited for the containers charged and debited for the containers returned. This shows the value of containers in the customers' hands. This is the method used for carboys, barrels and other of the lower price containers. This plan is, of course, impractical for tank cars and trucks. For these, individual records for each one are kept in the shipping department showing their location.

The company considers these containers to be part of its working equipment and carries them as fixed assets. The tank cars are depreciated over their expected life—twenty years. Tank trucks are similarly handled. All carboys, barrels, etc., are kept in first class condition. It is thus considered that the repairs and maintenance are equal to the depreciation expense. An amount has been figured of the average cost for repairs and maintenance for each trip made by the container. This rate times the number of trips made by the containers is charged to depreciation expense and the repairs and maintenance account is credited. The variation of the repairs and maintenance account is closed into profit and loss. If this is a large amount the rate must be revised. By means of his the company is able to ascertain more accurately the cost of its shipping and thus is able to figure more accurately the correct price to charge its customers.

Record is kept of all breakage within the plant and subtracted from the asset account and charged to operating expenses. On containers broken in the hands of the customers, no refund is allowed.

In the case of non-returned containers, a profit is made by the company and must be shown on the company's income tax statement. To determine this, records of the number of containers shipped and the number returned have been kept over a period of ten years. It thus has a fairly accurate figure of the percentage lost of those shipped out. At the end of the year this percentage is considered to be lost. These amounts are then cleared through the various container asset accounts, the reserves for redemption account, the reserve for depreciation account and any of the other accounts affected. The profit obtained is cleared into the profit and loss account. The company does not consider it necessary to maintain a reserve to redeem outstanding containers as it is more than offset by the accounts receivable.

The distributing company does not own many containers but receives them from its source of supply and is obliged to pay a deposit on them. It charges this same amount to its customers. On its invoices it has a statement that the containers must be paid for along with the material and that no discount is allowed on the containers. It thus does not in the general case have any separate accounts for containers but does segregate the different charges on the bills. In the case of the shoe industry, however, its customers have virtually refused to pay a deposit. In this case, to keep accurate records it has separate container accounts for each customer. This is a regular account receivable on the container ledger. By means of this a record is available of where the containers upon which they have not received a deposit are, and if a surplus of containers is being built up in the hands of the customers.

As it does not own the containers itself, it does not have a depreciation or repairs and maintenance problem. Breakage within the plant is considered an expense. Customers are never allowed to return broken containers.

A loss is taken on containers on which a deposit has not been collected and which have not been returned. This is determined by an arbitrary estimate made from the balance on each account. Because the company has paid its suppliers for this, it is a loss and is cleared into profit and loss. Since it can collect the deposit price from its suppliers, it need not and does not keep a reserve for redemption.

Compressed Gas Companies

"In the case of compressed and dissolved gases, the cost of the container, or cylinder is many times that of the product delivered in the cylinder.

"Cylinders for oxygen and dissolved acetylene must be of special construction, due to the characteristic properties of these products and to the high pressure involved. As these cylinders frequently move from one State into another, they are subject to Federal laws governing interstate commerce. They must meet rigid specifications established by the Interstate Commerce Commission. They must be built of high quality steel, with each step of construction subjected to rigid inspection. Periodic hydrostatic and other physical tests must be made to determine the fitness of the cylinder to remain in service. An exact life record of each cylinder must be maintained.

"Throughout all their service period, cylinders continue to incur expense for retesting, repairs, painting and for the maintenance of movement and test records. And, despite the care and attention given them, there is obviously a limit to their service life. Oxygen and dissolved acetylene cylinders therefore represent a sizable investment.

"The annual expense of the average cylinder for interest, depreciation, loss, damage, insurance, taxes, maintenance, recording and control is a very sizable factor. This expense is an important part of the cost of doing business and must be taken into consideration in determining the product selling price. It is the practice of oxygen and dissolved acetylene suppliers to cover in the product price only the expense represented by this factor for a thirty-day loan period. . . . When a cylinder is held for more than thirty days, however, the investment and upkeep expense factors for this additional period are not covered by sales income."*

Only one of the three companies examined kept a detailed numbered record of cylinders. This company follows the general trade practice and makes no charge for the containers loaned to customers. As a consequence there will be no charge on the customer's ledger for containers. However, it does keep detailed records

* The Linde Air Products Company, "Cylinder Rental," Copyright, 1935, by The Linde Air Products Company, New York, New York.

Tested 1 CYLINDER KEY CARD		
To Whom Shipped	Date of Shipped	Date of Return

EXHIBIT 4

Consigned to _____

Address _____

Destination _____ State _____ County of _____

Route _____ Car initial and No. _____

	Qt.	Description		

Specify Below Serial No. of Cylinders Shipped

Cyl. No.	In Date		Cyl. No.	In Date		Cyl. No.	In Date		Remarks

EXHIBIT 5

CYLINDER STATEMENT

(PLEASE KEEP THIS STATEMENT TO CHECK RENT INVOICES)

Alex Smith
Cambridge, Mass.

NOV.
30TH
1934

IF YOU DO NOT AGREE WITH THIS STATEMENT OF CYLINDER MOVEMENTS AND OUTSTANDING BALANCES, PLEASE ADVISE PROMPTLY.

The symbol DS indicates correction.

RECORD OF ACETYLENE CYLINDERS				RECORD OF OXYGEN CYLINDERS			
			OUTSTANDING 1ST OF MONTH 9				OUTSTANDING 1ST OF MONTH
DATE & SYMBOL	SHIPPED THIS MONTH	RETURNED THIS MONTH	OUTSTANDING BALANCE	DATE & SYMBOL	SHIPPED THIS MONTH	RETURNED THIS MONTH	OUTSTANDING BALANCE
Nov. 5	6	4	11*				
" 15	5	10	6*				
" 27	4		10*				

EXHIBIT 6

of the containers. Each container bears a number stamped on it. In the office a card file is kept having one card for each cylinder (Exhibit 4), the same number appearing on the card and the cylinder. In addition to this, each customer has a separate cylinder record sheet (Exhibit 5) in another file. When cylinders are shipped, a copy of the shipping order is sent to the office. On the cylinder card is entered the name of the company to which it is shipped and the date of shipment. In addition, the number of cylinders shipped to each customer is entered on the customer's sheet along with the serial number of each cylinder. When cylinders are returned, a copy of the receiving order is sent to the office and the same procedure is gone through. The card has the date returned marked on it and the cylinder record sheet has the date returned marked opposite each number that appears on the receiving order.

The company feels that this method gives them accurate information about the location of all cylinders and how long they have been out.

All three companies keep customer units records of containers out. At least one company sends a formal Cylinder Statement to each customer monthly. This form is shown in Exhibit 6. Rental charges are transferred each month into accounts receivable. All companies carry cylinders as fixed assets and depreciate them in the normal manner. Repairs and maintenance are charged to general expense. Container losses are determined by inventory and are charged to profit and loss except in cases where a customer loses a cylinder, in which case the customer is billed.

MECHANICAL CHECK WRITING

By A. A. Keiser, Accounting Machine Sales Department, National Cash Register Company, Dayton, Ohio

THE machine method of writing checks is the natural results of a demand for greater output where checks are written in large volume. The writing and signing of checks by hand naturally becomes an extremely routine operation, as the same physical motions are repeated over and over so many times. Due to the constant repetition of these motions, the mental effort drops to a point where it is considerably less than the physical effort. Hence, the hand signing of checks, when they are written in quantities, becomes in this sense purely a mechanical operation. In all cases the individual authorized to sign checks is one whose mental capabilities are too valuable to have them confined to duties so extremely routine.

The volume writing and signing of checks occurs in two classes: pay roll and dividend checks. It is therefore in reference to these two classes that this article is written.

Requirements for Mechanical Check Writing

In the development of a machine to write and sign checks, the most essential requirements are:

(a) *Safety.* The machine must provide features to protect the payment of cash and make it safer than hand writing and signing.

(b) *Increased output.* It is of course obvious that a machine will write and sign at a very greatly increased speed, compared with the number of individuals usually employed at the task.

(c) *Preventing alterations.* This also is recognized as a question removed from argument. Hand written figures and amounts can be changed and more easily manipulated than machine-printed figures. Machine writing has the advantage of specially manufactured inks which are not available for use in hand writing.

(d) *Facilitating the audit.* Likewise, it is evident that with the mechanical features available, auditing is made more effective and can be done in much less time.

(e) *Elimination of errors.* While checks are being written and signed they are automatically being added and distributed over a number of totals mechanically which naturally reduces errors, thus preventing checking and adding.

How These Requirements Are Met

To meet these conditions a machine now in general use will be used as a basis of this outline. This machine is equipped with a full adding machine keyboard, keys from 1 to 9 in each bank and as many banks as are needed for the capacity found to be necessary.

The operation of writing and signing a check is performed by first inserting a sheet of checks in the machine, then setting the amount of the check on the adding machine keyboard and pressing a motor bar. The result is that the check is automatically dated, numbered, the amount printed in two locations and at the same time automatically signed. Two signatures can be used if so desired. In fact the entire check is completed with the exception of inserting the name of the payee, which is a separate operation.

When the machine is operated by pressing the motor bar, the amount of the check is being added into a total or a group of totals selected at the will of the operator. Thus as pay roll checks are being written a distribution is obtained as a by-product of the writing operation.

In writing pay roll checks it is quite often desired to make deductions from the gross amount and to show these deductions either in the body of the check or on a stub which the employee can detach before cashing or depositing the check. In this case the machine operation is as follows: First the gross amount is recorded by setting the gross amount on the keyboard and pressing the motor bar. Next, the deductions are recorded singly by setting the amount of the deductions on the keyboard and pressing the motor bar, each requiring a separate operation. When the last deduction is recorded, the machine is operated and the net amount of the check is written automatically and at the same time the dating, number-

ing and signing takes place. In this case when the last check is written, we have an accumulation of the gross amounts, and the total for each type of deduction, thus providing a grand total of all the checks written.

While the checks are being written as just described, a check register (illustrated in Exhibit 1) which was inserted in the machine has been written automatically. This register can be prepared by having a preprinted roll of the employees if desired. When writing dividend checks (see Exhibit 2), it would have preprinted a list of stockholders together with the number of shares. As the checks are written, this sheet feeds itself through the machine, the width of spacing set to fit the form in use.

Checks are made in sheets of five each and advance automatically on each operation of the machine.

PAY ROLL CHECK REGISTER WITH SAMPLE OF CHECK

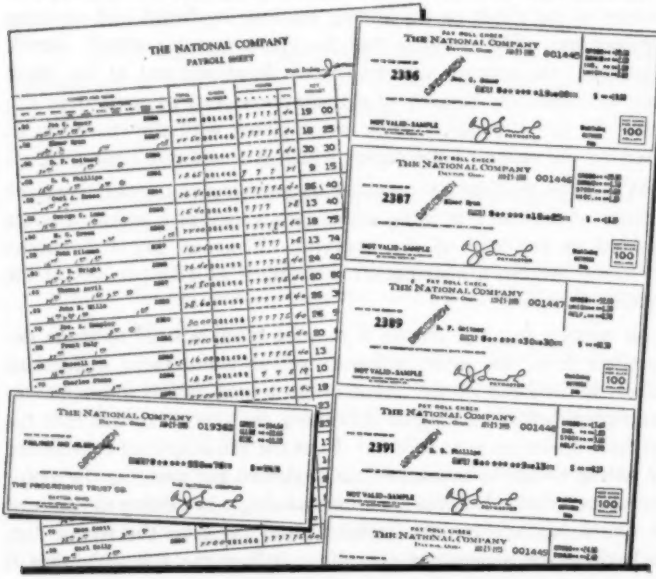

Exhibit 1

DIVIDEND CHECK REGISTER WITH SAMPLE OF CHECK

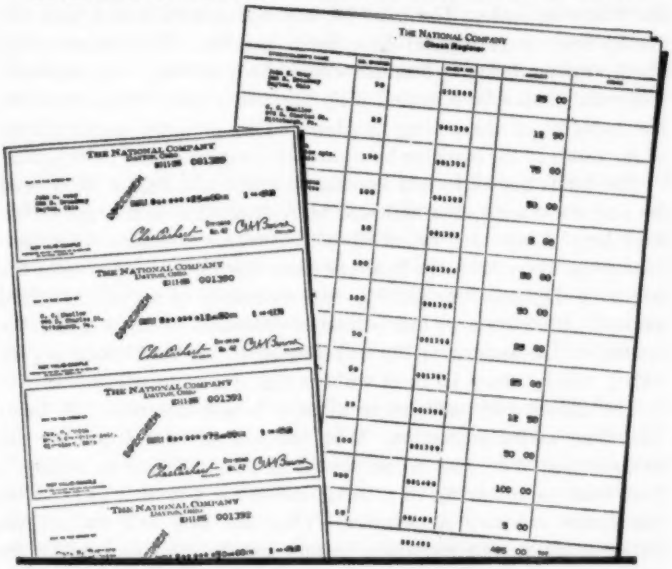

EXHIBIT 2

Safeguards Provided

The signature to the check is printed by means of a removable signature plate illustrated in Exhibit 3. To insert this plate it is necessary to use a key to unlock the compartment. When the plate has been inserted, the key cannot be removed without first locking it, so that the plate cannot be inserted or removed without the use of the key.

SIGNATURE PLATE

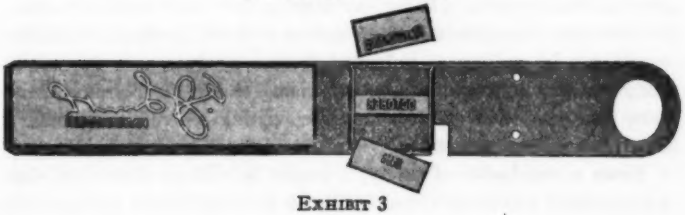

EXHIBIT 3

The safeguards built into the machine are provided by means of the following locks. The machine will not operate unless both the checks and check register have been inserted. This enforces the check register being written for every check written. The machine locks and cannot be operated if an amount is added which exceeds the capacity of the adding machine. This prevents manipulation of the totals in the machine by means of complementary subtraction.

The totals are all locked into the machine and cannot be cleared by any one except an authorized individual who carries the necessary key. Locks are provided with detector counters which advance one every time the lock has been opened. This prevents the use of a duplicate key getting into the hands of an unauthorized person. A separate auditor's total is provided which is under the control of the auditor or his representative. A check count is provided, which cannot be reset without the proper authority.

The dating and consecutive number is also controlled by locks providing added protection. With the use of these locks, we are assured that there can be no means of manipulation by setting a date back or the reuse of a check number. A master lock makes the entire machine inoperative. This one lock will control the entire machine and no single feature can be used as long as the master lock is kept locked.

The machine features enumerated above have been mentioned in order to show how the disbursement of funds can be controlled by one individual, whereas if the signing is delegated to a number of individuals as becomes necessary when a large number of checks must be written and signed within a given time, the responsibility for the disbursement is shared by the number of persons involved. We all know the danger of distribution of responsibility.

Surrounded with the safety features embodied in the machine writing which cannot be employed in hand signing, it becomes quite obvious that machine writing and signing is a safer method to use. If there was a weakness in the machine system, bonding companies would not be willing to indemnify losses as they now do. As a matter of fact it would not be surprising to see the bonding company quote a lower rate on machine writing where the necessary features are incorporated.

From a standpoint of safety, it might be well to state here, that a mechanical signature is more difficult to forge than a pen and ink

signature. It is much easier to procure a pen and ink and proceed to copy a signature than to get possession of a facsimile plate signature. Due to the value of this facsimile signature, it of course will be adequately safeguarded when not in use. No one would lock the safe and leave the combination posted on the wall beside the door.

Other Advantages

Checks should be written on one machine and signed by the same machine at one operation. Where checks are written on one machine and signed on another, there is always a danger of more checks being written than signed and vice versa. Whereas if the entire writing and signing is done simultaneously on the same unit and the proper safeguarded records are completed at the same time, there can be no doubt but that every check that is written is accounted for.

Due to the volume of checks to be written, the signing becomes the neck of the bottle through which the company's funds are disbursed. The officer signing the checks, due to this volume, must depend upon his subordinates to verify the proper authorization of the disbursement and see that they are written for the proper amounts. This being true the real authorization rests with the subordinates to a greater degree than with the disbursing officer himself. Inasmuch as he is delegating this responsibility to the clerical staff, it is his moral obligation to these people and to the company to install the proper equipment to protect the corporation's funds and at the same time place the clerical staff beyond suspicion.

As to the capacity output for the machine, one concern reports writing pay roll checks, averaging one deduction per check, 1,100 checks per hour. Another writing dividend checks, no deductions necessary, writes 1,500 checks per hour. Still another on dividend checks, issues 1,600 checks per hour. This means dating, numbering, writing the amount, signing, (countersigning if necessary), counting, writing the check register and adding the amounts into the necessary number of totals.

Some one has said that a man ought not be employed at a task that a machine can perform. This becomes particularly true when the saving of time is as great as in this case. Since it never will be possible to inject thinking powers into a machine in order to bring it up to a level with the human being, then it does not ap-

pear logical to bring the human being down to a par with the machine and waste the physical effort that it required to perform a machine function. Having been endowed with a faculty for thinking, isn't it an economic waste to discard this human capability and use only the less valuable faculty, viz., the physical power?

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